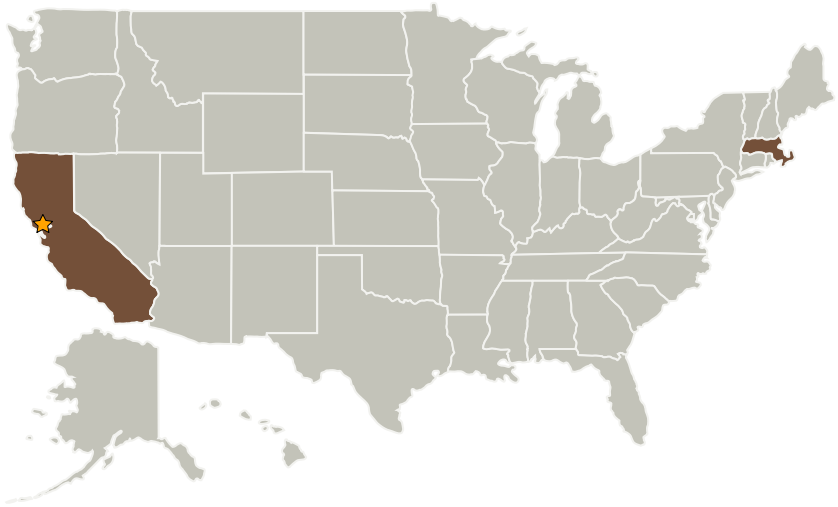
Onboard Space Autonomy Through Integration of Health Management and Control Reconfiguration, Phase I

Completed Technology Project (2005 - 2005)

Project Introduction

In this SBIR project we propose to integrate spacecraft control and vehicle health functions to improve the robustness and productivity of space operations. The main advantages of the proposed approach is that it allows the spacecraft to utilize failed control components with degraded performance to the maximum extent, and to conduct health status test with minimum or no impact on the mission, all in an autonomous manner. The proposed approach is innovative because traditional approaches typically abandon the failed component completely after the first sign of malfunctioning. Putting all the burden on the remaining components wear them down faster and shorten their useful life. Through the integration of accurate health monitoring and control reconfiguration algorithms in a hierarchical architecture, the proposed approach adjust the command signal to the failed component according to its degree of degradation, with the shortfall distributed among the remaining undamaged control components. This results in balanced utilization of all the available resources at all time, and increase the mission life of the spacecraft. During Phase II, the developed algorithms will be integrated into an Autonomous Spacecraft REconfigurable Control System (ASRECS) prototype for NASA testing and evaluation.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Scientific Systems Company, Inc.	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Woburn, Massachusetts

Primary U.S. Work Locations	
California	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Elizabeth M Robinson

Principal Investigators:

Michael J French
Eliot Li

Technology Areas

Primary:

- TX10 Autonomous Systems
  - TX10.2 Reasoning and Acting
    - TX10.2.6 Fault Response